

rat proofing m o h -

U. S. PUBLIC HEALTH SERVICE

Headquarters Office, 605 Volunteer Building, Atlanta 3, Georgia

U.S. MALARIA CONTROL IN WAR AREAS

Typhus Control Memorandum No. 11

August 20, 1945

To: The District Directors, State Health Officers and Others  
Concerned

Attn: Typhus Control

From: Engineering Division, Typhus Control Section

Subject: Inauguration of Ratproofing and Rat Eradication Projects

I. General

These projects constitute permanent typhus control programs, are generally conducted by local health departments with supervisory assistance from state health departments, and may be coordinated with the general sanitation program of the local health department. Permanent inspectional and maintenance service should be included.

A. Definitions

1. Ratproofing - Ratproofing is defined as a relatively inexpensive method of construction designed to keep rats and mice from entering business buildings and to limit their travel within buildings (as from establishment to establishment and room to room) as much as possible. It also embraces all of the following items to the extent that they are feasible: Elimination or reduction of interior and exterior rat harborages, clean-up, proper storage of garbage and proper stacking of materials or merchandise. Owners of buildings are generally required to defray all material and labor costs, except supervision, of ratproofing.

2. Rat Eradication - In conjunction with ratproofing activities, rat eradication means the complete elimination of rats within ratproofed buildings. All methods or any combination of methods of rat eradication may be used, including the use of poisoned baits, poisoned water, fumigants, and traps. The average rat infested building can be freed of rats within a month following ratproofing. Occupants of establishments are usually charged for all rat eradication services except supervision.

In residential and rural areas, rat eradication means regular rat extermination measures conducted to reduce the rat population to the lowest practicable point. Any or all of the above methods are applicable except that trapping is not recommended as a general procedure in non-ratproof buildings or premises.

Communicable Disease Center  
Library

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Atlanta 5, Georgia



August 20, 1945

## B. Scope

1. Urban Projects - These projects include ratproofing, rat eradication and rodent ectoparasite control in urban business establishments, approval of plans for new and remodeled buildings relative to ratproof construction and city-wide rodent control in urban areas.
2. County-wide Projects - In areas of high typhus endemicity only county- or area-wide projects should be established, in which case rural rat eradication may be provided in addition to the above in each community.
3. DDT Dusting - The control of rodent ectoparasites by the application of DDT dust is limited under these (ratproofing) projects to ratproofed business establishments. Where more extensive application is desired, DDT dusting projects may be conducted simultaneously as outlined in Typhus Control Memorandum No. 5.

## 11. Preliminary Requirements

The following preliminary requirements are suggested for adoption by the state health departments before Public Health Service participation is requested in a project proposal:

- A. Approval by the Headquarters Medical Division for operations in the particular county involved, whether by pre-approval or by clearance on the basis of epidemiological evidence submitted.
- B. Passage of a rodent control ordinance (sample attached)
- C. The provision of appropriations locally for:
  1. Revolving or operation fund (\$1,500 to \$15,000, depending upon the size of communities and number and size of crews desired).
  2. Permanent personnel (salaries of personnel, both supervisory and clerical, necessary to continue and maintain the program should be made available in the health department, city or other local budget). Personnel should be properly qualified, capable of learning, and able eventually to assume responsibility of the program on a permanent basis.
  3. Equipment:
    - a. Permanent automotive equipment
    - b. Capital equipment not provided in C,1.
  4. Rental of office, storage and work-room space.
- D. Due consideration and enforcement of items of general sanitation, particularly with reference to garbage storage and disposal, and the ratproof construction of new buildings.



August 20, 1945

### III. Public Health Service Participation

Project proposals prepared by the State Health Department (see Typhus Control Memorandum No. 3) may request participation of the U. S. Public Health Service in Ratproofing and Rat Eradication Projects.

#### A. State-wide - General

Public Health Service participation may include:

1. Assistance in the establishment or expansion of typhus control as a function of the State Health Department, together with the establishment of any necessary intra-state offices.
2. The provision of sub-professional and professional supervisory personnel to assist local health departments in promoting, organizing and operating projects for the period necessary to enable local health personnel to conduct and maintain such programs.

#### B. Local Projects

1. Approval - The approval of such projects will be based upon:

- a. Concurrence by the Headquarters Medical Division as to the extent of typhus problem in the particular county or area (reference is made to "Epidemiological Data for Murine Typhus Control Activities" and Typhus Control Memorandum No. 8).
- b. Fulfilment of preliminary requirements (see II above) as established by the State Health Department.

2. Extent of Participation

Public Health Service participation may include:

- a. Professional and/or sub-professional supervisory personnel during initial period.
- b. Automotive and capital equipment as may be needed temporarily in the conduct of the programs. (Items necessary for future continuation and maintenance of a program should be provided locally, as under II-C-3 above.)
- c. Certain materials or equipment for rodent or rodent ectoparasite elimination, which cannot be readily obtained locally but which are essential to adequate control.
- d. Limited facilities for program evaluation.
- e. Training and educational services and limited technical and investigational assistance from Headquarters office.



August 20, 1945

IV. Personnel

Under budget limitations, federally paid personnel ceilings for ratproofing and rat eradication projects have been established for each state. Because of very limited man-year ceilings for ratproofing-eradication work, personnel on Federal payroll should be limited to Area Supervisors, and, if necessary, Assistant Area Supervisors. All other personnel should be furnished from non-Federal funds.

The provision of state or local funds for personnel to become trained as permanent local supervisors and inspectors will insure the continuation of the program locally and will permit the fullest utilization of Service personnel (a properly planned project should require Service participation of only three to six months during organization and training, thus releasing the personnel to move on to a new project in a comparatively short time).

To avoid excessive health department budgets for typhus control and to assess charges on the beneficiaries of ratproofing and rat eradication, the employment of all labor, including foremen, out of the revolving fund is recommended. Ratproofing can proceed as rapidly as desired under this plan by adding ratproofing crews. Project proposals should include the full number of personnel to be employed at any one time.

The following personnel, listed by function rather than by title, are suggested for ratproofing and rat eradication programs in cities of various sizes:

<u>Personnel</u>	<u>Cities of (population)</u>			
	Under 10,000	10,000 to 20,000	20,000 to 50,000	Over 50,000
Area Supervisor*	1	1	1	1
Asst. Area Supervisor*	0	1	1	2
Sanitarian (local)	1	1	1	1
Asst. Sanitarian (local)	0	1	2	2 or more
Typhus Control Asst. (contact)/	0	1	1	1 or more
Clerk	1 P.T.	1 P.T.	1 P.T.	1 or more or F.T.
Construction Foreman/	1	1	1-2	2 or more
Skilled Laborers (construction)/	2-4	2-4	4-8	6 or more
Laborers (construction)	2-4	2-4	4-8	12 or more
Eradication Foreman/	0	0	1-2	2 or more
Skilled Laborers (eradication)/	1	2	2-4	4 or more

\*Personnel may be furnished with U.S.P.H.S. funds.

/Personnel chargeable to revolving fund. It is suggested that the size of the construction crews be limited to a foreman and nine laborers, with several crews planned for larger cities. A second crew should generally not be hired until the first crew is fully operating and then it may be split up to form the nuclei of two crews.



August 20, 1945

V. Equipment

The magnitude of operations and number of ratproofing crews determine the type and amount of equipment necessary. The following equipment is suggested on the basis of one crew for cities up to 20,000, one or two crews for cities between 20,000 and 50,000, and two or more crews for cities over 50,000 population:

<u>Equipment</u>	<u>Cities of (population)</u>			
	Under 10,000	10,000 to 20,000	20,000 to 50,000	Over 50,000*
1/2-ton pick-up truck or equivalent	1	1	1	2 or more
3/4-ton panel body truck or equivalent	0	1	2	2 or more
Mobile Workshop (truck or trailer)	1	1	1-2	1 or more
Set of tools and equipment-- Ratproofing (list attached - MCWA 702)	1	1	1-2	2 or more
Set of Equipment--Rat Eradication (list attached - MCWA 703)	1	1	1-2	2 or more
Set of Laboratory Equipment. (list attached - MCWA 704)	1	1	1	1

\*Note: In cities over 50,000, stationary workshops may be desirable instead of a complete mobile workshop for each crew. All equipment needed for maintenance and inspectional service after completion of ratproofing should be furnished locally. Equipment to be amortized by ratproofing work may be purchased from the revolving fund and collections made by local charges. All items, permanently needed, but for which charges to business men are not contemplated should be provided for in the local budget. Under the provisions outlined in III-B, the Service may provide certain equipment.

VI. Materials and Supplies

Except for certain items or unusual circumstances, it is generally preferable to confine initial orders for materials and supplies to an amount sufficient to carry the project only two to four months. This enables the project to operate on a smaller revolving fund and will eliminate the purchase of large amounts of materials which later may not be needed. The attached list, MCWA 705 (additional copies available upon request), provides initial equipment which is peculiar to ratproofing and rat eradication activities and which, therefore, may not be quickly available locally. Other items depend upon the nature of the construction work involved and it is not intended that the list include all items required during the first two to four months of operations. Materials readily available should only be purchased as the need arises. For materials requiring priority, typhus control activities by local health departments or cities are covered by War



August 20, 1945

Production Board Regulation CMP 5, which permits MRO priority ratings of AAL to AA3, depending upon the material. Headquarters may be able to loan certain materials to states to assist in establishing state stockpiles. The state should handle the distribution of materials to programs and the subsequent repayment in kind.

In addition to the attached list of construction and eradication materials, the following supplies will be needed:

- Office Supplies
- Maps
- Copies of Ordinance
- Forms:
  - Letters of Notification
  - Ratproofing and Rat Eradication Agreements
  - Survey Record and Work Sheet\*
  - Rat Eradication Record\*
  - Record of Fumigation\*
  - Notification of Completion of Ratproofing and Rat Eradication
  - Invoices
  - Cooperating Placards\*

\*Supplies of these items have been furnished to each state. Sample copies of each of the forms, as recommended by this Office, will be furnished upon request.

#### VII. Special Equipment and Materials for Fumigation

Fumigation of buildings has a definite place in the ratproofing and rat eradication program but should be conducted only by trained and experienced personnel. Hydrocyanic acid gas is the recommended fumigant and, because of ease of application, discoids are preferred to other types. G-fumigant may be used to supplement discoids. A room or building should never be fumigated with A-dust. Adequate preliminary preparations, including a survey and measurement of building, notification of proper authorities and occupants, sealing of all openings in building, and provision of necessary safety and first aid equipment and guards, are essential. The person in charge should be an approved experienced fumigator. It is recommended that only rat-proof buildings be fumigated.

#### VIII. Operations

##### A. Policies

Policies concerning relationships between the state health department and local agencies relative to operational procedures should be established prior to inauguration of activities. Included are such items as: Publicity, records, methods of estimating and charging for the work, manner of notifying businessmen, billing



August 20, 1945

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<u>Equipment</u>	<u>Cities of (population)</u>			
	Under 10,000	10,000 to 20,000	20,000 to 50,000	Over 50,000*
1/2-ton pick-up truck or equivalent	1	1	1	2 or more
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Mobile Workshop (truck or trailer)	1	1	1-2	1 or more
Set of tools and equipment-- Ratproofing (list attached - MCWA 702)	1	1	1-2	2 or more
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Set of Laboratory Equipment. (list attached - MCWA 704)	1	1	1	1

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August 20, 1945

and responsibilities of each employee, policy relative to individuals desiring to perform the ratproofing or eradication operations themselves or hire private contractors or pest control operators. It is suggested that occupants be encouraged to continue existing contracts with private pest control operators for rat control, particularly for the permanent maintenance following the freeing of buildings of rats.

#### B. Organization

Generally, a period of two weeks or more is required to procure the necessary equipment and supplies; to determine where to begin, to estimate the first two blocks, and to hire, organize and start training personnel. The success of the program largely depends upon the completion of all organizational phases and the manner operations proceed in the first few blocks.

#### C. Operations

Ratproofing and rat eradication projects should proceed block by block throughout the business area of the city or community and then should be extended to all outlying business areas. Actual construction work and eradication activities should be carried out in each business establishment and building by either the health department crew or by others as the case may be. Orderly progression from establishment to establishment should be planned. Each ratproofed establishment should be entirely freed of rats before eradication activities cease.

#### D. Maintenance

Routine inspections of ratproofed buildings are generally required at 30 to 45 day intervals in the ordinance. These are strongly recommended to determine the presence of, and eliminate, leaks and/or rat re-infestation.

#### E. Enforcement of Ordinances

1. Ratproofing and Rat Eradication - The mere existence of an ordinance is usually sufficient to secure satisfactory compliance in connection with ratproofing and rat eradication activities. Legal enforcement measures have not been required on many previous programs. However, they may have to be resorted to in the case of an extremely recalcitrant owner or occupant.

2. New Building Construction - Provision should be made in the city or county government, health department or city engineer department, to review and approve plans relative to all new buildings in order to insure ratproof construction. Wholesale



August 20, 1945

ratproofing of existing residences is not generally recommended but all new ones should be properly constructed. Provision should be made to enforce this section of the rodent control or other applicable ordinance.

3. Garbage Disposal - It is important in vermin control that garbage be stored, collected and disposed of in an approved sanitary manner. The garbage or rodent control ordinance should be enforced relative to these items, particularly with reference to storage on the premises.

For the Chief, Engineering Division.

John S. Wiley  
Senior Asst. Sanitary Engineer  
i/c Typhus Control Section  
Engineering Division



SAMPLE RODENT CONTROL ORDINANCE

MCWA Form 701

ORDINANCE

NO. \_\_\_\_

CITY OF \_\_\_\_\_

194\_\_

An Ordinance to protect the public health by controlling the spread of endemic typhus fever, and other rat-borne diseases and infections associated with the unsanitary conditions present wherever rats are found by requiring that certain structures shall be maintained in a ratproof and rat-free condition, by providing for the storage of food and feed and the handling of garbage, by eliminating certain conditions favoring the harborage of rats, and to provide penalties for violation thereof.

BE IT ORDAINED BY THE BOARD OF COMMISSIONERS OF THE CITY OF \_\_\_\_\_.  
Section (1). That for the purposes of this ordinance the following definitions shall apply:

(A) The term "Business buildings", shall mean any structure whether public or private, that is adapted for occupancy for transaction of business, for rendering of professional service for amusement, for the display, sale or storage of goods, wares, or merchandise, or for the performance of work or labor, including hotels, apartment buildings, tenement houses, rooming houses, office buildings, public buildings, stores, theaters, markets, restaurants, grain elevators, abattoirs, warehouses, workshops, factories, and all outhouses, sheds, barns and other structures on premises used for business purposes.

(B) The terms "rat stoppage" or "ratproofing" as used herein applies to a form of ratproofing to prevent the ingress of rats into business buildings from the exterior or from one business building to another. It consists essentially of rendering all actual or potential openings in the exterior walls, ground or first floors, basements, roofs and foundations, that may be reached by rats from the ground, by climbing or by burrowing, with material impervious to rat gnawing.

(C) The term "rat harborage" shall mean any condition which provides shelter or protection for rats, thus favoring their multiplication and continued existence in, under, or outside of a structure of any kind.

(D) The term "Health Officer" as used herein means the Superintendent of Health or any duly authorized person who may represent him.

(E) The term "owner" shall mean the actual owner of the business building, whether individual, partnership, or corporation, or the agent of the building or other person having custody of the building or to whom rent is paid. In the case of business buildings leased with a clause in the lease specifying that the lessee is responsible for maintenance and repairs the lessee will be considered in such cases as the "owner" for the purposes of this ordinance.

(F) The term "occupant" as used herein shall mean the individual, partner-



ship, or corporation that has the use of or occupies any business building or a part or fraction thereof, whether the actual owner or tenant. In the case of vacant business buildings or any vacant portion of a business building the owner, agent or other person having custody of the building shall have the responsibility of an occupant of a building.

Section (2). BE IT FURTHER ORDAINED: That it is hereby provided and required that all business buildings in the City of \_\_\_\_\_ shall be ratproofed, freed of rats, and maintained in a ratproof and rat-free condition under the direction and supervision of the Health Officer.

Section (3). BE IT FURTHER ORDAINED: That upon receipt of written notice and/or order from the Health Officer the owner of any business building specified therein shall take immediate measures for ratproofing the building, and that unless said work and improvements have been completed by the owner in the time specified in the written notice, in no event to be less than fifteen (15) days, or within the time to which a written extension may have been granted by the Health Officer, then the owner shall be deemed guilty of an offense under the provisions of this ordinance.

Section (4). BE IT FURTHER ORDAINED: That whenever the Health Officer notifies the occupant or occupants of a business building that there is evidence of rat infestation of the building said occupant or occupants shall immediately institute appropriate measures for freeing the premises each occupies of all rats, and that unless suitable measures for freeing the buildings of rats are instituted within three (3) days after receipt of notice and unless continuously maintained in a satisfactory manner until the building is free of rats the Health Officer is hereby authorized and directed to free the building of rats at the expense of the owner thereof, and the Health Officer shall submit bills for the costs thereof to the owner or occupant of the building, and if the same are not paid the Health Officer shall certify the amount due from the owner or occupant to the City Attorney, and the City Attorney shall bring suit to collect the same.

Section (5). BE IT FURTHER ORDAINED: That the occupants of all ratproofed business buildings are required to maintain the premises in a ratproof condition and to repair all breaks or leaks that may occur in the ratproofing unless such breaks or leaks develop as the result of natural deterioration of the building.

Section (6). BE IT FURTHER ORDAINED: That from and after passage of this ordinance the Health Officer is empowered to make unannounced inspections of the interior and exterior of business buildings, as in his opinion, may be necessary to determine full compliance with this ordinance, and the Health Officer shall make periodic inspections at intervals of not more than forty-five (45) days of all rat-stopped buildings to determine evidence of rat infestation and the existence of new breaks or leaks in their ratproofing and when any evidence is found indicating the presence of rats or openings through which rats may again enter business buildings the Health Officer shall serve the owners or occupants with notices and/or orders to abate the conditions found.

Section (7). BE IT FURTHER ORDAINED: That whenever conditions inside or under business buildings provide such extensive harborage for rats that the Health Officer deems it necessary to eliminate such harborage he may require the owner to install suitable cement floors in basements or to replace wooden first or ground floors or require the owner and/or occupant to correct such interior rat harborage as may be necessary in order to facilitate the eradication of rats in a reasonable time.



Section (8). BE IT FURTHER ORDAINED: That it shall be unlawful under the provisions of this ordinance for the occupant, owner, contractor, public utility company, plumber or any other person to remove the ratproofing from any business building for any purpose and fail to restore the same in a satisfactory condition or to make any new openings that are not closed or sealed against the entrance of rats.

Section (9). BE IT FURTHER ORDAINED: It shall be unlawful for any person, firm or corporation hereafter to construct, repair or remodel any building, dwelling, stable or market, or other structure whatsoever, unless such construction, repair, remodeling or installation shall render the building or other structure ratproof in accordance with the regulations prescribed herein and hereunder; Provided that only such repairs, remodeling or installation as effect the ratproof condition of any building or other structure shall be considered as subject to the provisions of this ordinance. Furthermore, it shall be unlawful for any person, firm or corporation hereafter to occupy any building or structure wherein foodstuffs are to be stored, kept, handled, sold, held or offered for sale without complying with the ratproof regulations prescribed herein and hereunder for existing buildings and structures. No license from the city to conduct or carry on a business will be issued to any person, firm or corporation until the requirements of this ordinance have been complied with. When a building or other structure shall have been ratproofed in accordance with the regulations prescribed herein and hereunder, the owner shall, without a specific order of the City Health Officer and regardless of need for remodeling, repair or installation, maintain such building or structure in a ratproof condition.

Section (10). BE IT FURTHER ORDAINED: That all food and feed kept within the City of \_\_\_\_\_ for feeding chickens, cows, pigs, horses, and other animals shall be kept and stored in rat-free and ratproof containers, compartments, or rooms unless kept in a ratproof building.

Section (11). BE IT FURTHER ORDAINED: That within the corporate limits of the City of \_\_\_\_\_ all garbage or refuse consisting of waste animal or vegetable matter upon which rats may feed, and all small dead animals, shall be placed and stored until collected by the garbage department in covered containers of a type prescribed by the Health Office according to existing conditions, and that it is hereby declared unlawful for any person, firm, or corporation to dump or place on any premises, land or waterway, any dead animals, or any waste vegetable or animal matter of any kind.

Section (12). BE IT FURTHER ORDAINED: That it shall be unlawful for any person to place, leave, dump, or permit to accumulate any garbage, rubbish or trash in any building or premises in the City of \_\_\_\_\_ so that same shall or may afford food or harborage for rats.

Section (13). BE IT FURTHER ORDAINED: That it shall be unlawful for any person to permit to accumulate on any premises, improved or vacant, and on all open lots and alleys in the City of \_\_\_\_\_, any lumber, boxes, barrels, bricks, stones or similar materials that may be permitted to remain thereon unless same shall be placed on open racks that are elevated not less than eighteen (18) inches above the ground, and evenly piled or stacked so that these materials will not afford harborage for rats.

Section (14). BE IT FURTHER ORDAINED: Penalty: Any person, firm, or corporation who shall violate any provision or provisions of this ordinance shall be deemed guilty of a misdeameanor and upon conviction shall be punished by a fine



of not less than One Dollar (\$1.00) nor more than Fifty Dollars (\$50.00). Each day's violation shall constitute a separate offense.

Section (15). BE IT FURTHER ORDAINED: That if any section, subsection, sentence, clause or phrase of this ordinance is for any reason held to be unconstitutional, void, or invalid, the validity of the remaining portions of this ordinance shall not be affected thereby, it being the intent in adopting this ordinance that no portion thereof or provision or regulation contained therein shall become inoperative or fail by reason of the unconstitutionality or invalidity of any other portion or provision or regulation.

Section (16). BE IT FURTHER ORDAINED: That this ordinance take effect soon and after its passage, the matter being one of urgency and necessity and the public welfare requiring it.

Order No. \_\_\_\_\_

Date \_\_\_\_\_

APPROVED: \_\_\_\_\_

ADDITIONAL CLAUSES FOR CONSIDERATION:

(1) Quarantine clause. - Two ordinances have been enacted containing clauses in Section 3 that permit the health officer, at his discretion, to close and quarantine any business building in which there is any evidence of rat infestation if the owner and/or occupant do not comply with the health officer's orders to ratproof it and rid it of rats. A quarantine provision adds considerable force to an ordinance, and is worth considering when formulating rat control legislation.

(2) Inefficiency of section dealing with food for domestic stock. - Proper storage of food for chickens and other domestic animals will tend to starve out some rodents but will not affect the livelihood of others that feed with and after domestic stock. Therefore, Section 9 is only a temporizing measure and should be replaced as soon as conditions permit by another section prohibiting the raising or maintenance of chickens and other stock within corporate limits.

(3) Clarifying section providing for making collections in advance. - None of the provisions of the sample ordinance specify that any municipal agency must be employed to ratproof buildings and to rid them of rats, but neither do they indicate that responsible individuals can carry out the orders of the health officer or employ others to do the required work. Therefore a section clarifying this point is of practical value in an ordinance. Furthermore, if the municipality desires to collect fees in advance when the work is done by an organization of the health department, this should also be incorporated in the ordinance. Several communities have now operated domestic rat control programs very satisfactorily when collections were made in advance, finding that businessmen were just as willing to make advance payments as to wait and pay the charges after completion of the work. Collecting in advance reduces the charges businessmen have to pay because of the reduction in bookkeeping costs or overhead expenses. The following section which is quoted from an ordinance adopted by a municipality clarifies the manner of operating a rodent control program and specifies that work done by the city must be paid for in advance.

"BE IT FURTHER ORDAINED: That the owner of a business building in complying with the provisions hereof relative to ratproofing said building, and occupant in



maintaining his premises ratproof and in pursuing a system of rat elimination as required in Sections 4 and 5 hereof, may do the work himself, or engage a contractor to do the work, or may employ labor and purchase such materials as may be necessary, all to the approval of the Health Officer. At the option of such owner or occupant, however, such owner or occupant may make application to the Health Officer who will have the necessary ratproofing or work of rat elimination done at cost. The cost in each case, whether for original ratproofing or elimination, or for renewals thereof, shall be agreed upon by the owner or occupant, as the case may be, and the Health Officer, prior to doing the work of ratproofing or rat elimination, and the amount paid in advance in each case to the Treasurer of the City of \_\_\_\_\_."



LIST OF TOOLS AND EQUIPMENT FOR  
ONE RATPROOFING CREW (6 - 8 men)

\* Tools needed if carpenters who have their own are hired.

NO.	UNIT	Description of Item	Unit Cost	Cost
1	ea.	Axe, Single Bit, Handled, 4 lb. head	\$ 2.30	\$ 2.30
2	ea.	Bar, Carpenter's Wrecking, Gooseneck, 24"	0.40	0.80
*6	doz.	Battery, Flashlight Cells	* 0.48	* 2.88
1	set	Bit, Wood Auger, One ea. 4,5,6,7,8,10,12, 14 and 16/16 ths.	3.25	3.25
2	ea.	Bit, Screw Driver $\frac{1}{4}$ " bit	0.20	0.40
2	ea.	Bit, Screw Driver, $\frac{3}{8}$ " bit	0.20	0.20
1	doz.	Blade, Hack Saw, 12", 18 teeth per in., Carbon Steel	0.60	0.60
1	ea.	Bob, Plumb, 18 oz.	0.35	0.35
1	ea.	Brace, Bit, Box Ratchet, 10" sweep	6.00	6.00
*1	ea.	Brake, Chicago Metal Bending, 6-ft or 8-ft, 18 guage capacity	*250.00	*250.00
*1	ea.	Broom, Warehouse, No. 36	* 1.00	* 1.00
2	ea.	Brush, Paint, $2\frac{1}{2}$ " width, Flat	0.80	1.60
*6	ea.	Brush, Wire Wheel, Osborne #1784, 6"	* 0.18	* 0.18
*6	ea.	Bucket, Galvanized, 14-quart capacity	* 0.45	* 2.70
*4	doz.	Bulb, Flashlight	* 0.36	* 1.44
3	ea.	Chisel, Cold, 1"	0.75	2.25
1	set	Chisel, Wood, Socket Firmer, One ea. $\frac{1}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", and $1\frac{1}{2}$ "	6.50	6.50
2	ea.	Clamps, "C", Opens 4"	0.56	1.12
1	ea.	Clamp, Saw, to screw to bench, $9\frac{1}{2}$ " jaws	1.00	1.00
2	ea.	Cutter, Glass, Red Devil 023	0.20	0.40
1	ea.	Drill, Breast, Miller Falls #12	4.40	4.40
*1	set	Drill, Star, 12" length, one each $5/16$ ", $3/8$ ", $3/4$ ", and 1"	* 1.30	* 1.30
1	set	Drill, Twist, Straight Shank, Carbon Steel, $1/8$ " to $1/2$ " by 16ths.	3.25	3.25
*1	ea.	Edger, Cement, Regular, Length 6"	* 0.50	* 0.50
2	ea.	File, Mill Bastard, 12"	0.20	0.40



No.	Unit	Description of Item	Unit Cost	Cost
6	ea.	File, Rebular Taper, Single cut 6"	\$ 0.11	0.66
*8	ea.	Flashlight, Pre-focus, 2-cell	* 0.36	* 2.88
1	ea.	Frame, Hacksaw 12", Millers Falls #90	0.75	0.75
1	ea.	File, Round Bastard, 8"	0.25	0.25
*2	pr.	Goggles, Shallow Cup, Transparent Hardener Lenses (Bullard #536)	* 1.50	* 3.00
*1	ea.	Grinder, Bench, 6", Stanley #66, one shaft to be equipped with 6" wire brush	* 23.75	*23.75
*2	ea.	Hammer, Brick, 1½ lb.	* 1.00	* 2.00
*1	ea.	Hammer, Machinist, Ball Pein, 1 lb.	* 0.75	* 0.75
*1	ea.	Hammer, Machinist, Ball Pein, 2 lb.	* 1.50	* 1.50
6	ea.	Hammer, Nail, Curved Claw, 1 lb.	0.85	5.10
2	ea.	Hammer, Nail, Ripping (Straight Claw) 1 lb.	1.15	2.30
*1	ea.	Hammer, Sledge, Double Face Blacksmiths, 10 lb*	1.85	* 1.85
*1	ea.	Kit, First Aid, Bullard weather proof #110 in waterproof steel case with wall bracket	* 4.00	* 4.00
2	ea.	Knife, Putty, 1¼"	0.20	0.40
*1	ea.	Ladder, Extension, Common, 24 ft.	* 15.00	*15.00
*1	ea.	Ladder, Step, 8 ft.	* 5.00	* 5.00
*1	ea.	Lamp, Trouble, 20 ft. cord, Guard and Hook	* 2.00	* 2.00
1	ea.	Level, Carpenter, 24"	2.20	2.20
1	ea.	Level, Line, 3½"	0.40	0.40
1	ea.	Level, Square, 4"	0.80	0.80
*4	ea.	Mallet, Tinnners', Round Hickory Head, 3" x 5½"	* 0.40	* 1.60
*2	ea.	Oiler, Hand, Steel (Oil Can)	* 0.35	* 0.70
*6	ea.	Padlock, #1 Master	* 1.65	* 1.65
1	ea.	Pick, Railroad	1.21	1.21
1	ea.	Plane, Block, 7" (Stanley #220)	1.20	1.20
1	ea.	Plane, Jack, 14" (Stanley #5)	5.00	5.00



<u>NO.</u>	<u>Unit</u>	<u>Description of Item</u>	<u>Unit Cost</u>	<u>Cost</u>
2	ea.	Pliers, Long Nose, 6"	\$ 1.75	3.50
6	ea.	Pliers, Linemens', Side Cutting, 8"	1.90	11.40
2	ea.	Punch, Metal Whitney #5 Jr., Capacity - $\frac{1}{4}$ "		
		Hole in 16-gauge, Set of dies and punches	* 7.70	*15.40
*1	ea.	Punch, Metal, Whitney, #2 Capacity 5/16", hole in $\frac{1}{4}$ " thickness (with 5/32" punch and die)	* 16.50	*16.50
4	ea.	Punch, Center, 5/16" stock, Length-4",	0.25	1.00
4	ea.	Punch, Prick, 5/16" stock, Length-4"	0.25	1.00
*1	ea.	Rake, Round Bow, Steel, 14" width of head	* 1.00	* 1.00
1	ea.	Rasp, Wood, Flat, 12"	0.85	0.85
1	ea.	Rasp, Wood, Flat, 16"	1.15	1.15
20	lbs	Raop, Bengal, 3/4"	0.32	6.40
4	ea.	Rule, Steel Tape, 6'	0.83	3.32
4	ea.	Rule Extension with lock joints and strike plates, 6'-6"	0.75	3.00
4	ea.	Rule, Spring Joint, Zig Zag, 6'	0.21	0.84
1	ea.	Saw, Compass, 12" blade	0.60	0.60
2	ea.	Saw, Crosscut, 26" blade, 8-point	3.75	7.50
1	ea.	Saw, Hand, Rip, 26" blade, 5 $\frac{1}{2}$ -point	4.25	4.25
4	ea.	Screwdriver, Carpenters', 6" Blade	0.25	1.00
4	ea.	Screwdriver, Carpenters', 8" Blade	0.40	1.60
*4	ea.	Set, Rivet for 1 $\frac{1}{2}$ lb to 2; lb rivets	* 0.75	* 3.00
4	ea.	Set, Nail	0.08	0.32
*2	ea.	Shovel, Long Handle, Rd. Pt.	* 1.00	* 2.00
*2	ea.	Shovel, Long Handle, Sq. Pt.	* 1.00	* 2.00
*1	ea.	Shovel, D Handle, Rd. Pt.	* 1.00	* 1.00
*1	ea.	Shovel, D. Handle, Sq. Pt.	* 1.00	* 1.00
*1	ea.	Slitter, Metal, Bench type, 10 ft. capacity, Without bench	* 55.00	*55.00
*1	ea.	Snips, Bulldog, 17"	* 3.50	* 3.50
*1	ea.	Snips, Scroll-Pivoter, (aviation type) 12"	* 3.85	* 3.85
4	ea.	Snips, Tinnners, Regular, Straight Pattern, 13"	2.00	8.00
3	ea.	Square, Combination, 12" Blade, with Level and Scriber	1.00	3.00
2	ea.	Square, Framing, 24" Body, 12" Tongue	3.00	6.00
1	ea.	Stone, Sharpening, Carborundum Combination, 6"	1.25	1.25
1	ea.	Tape, Corded, Measuring, 50ft., $\frac{1}{2}$ " wide, Metal case.	1.00	1.00
*2	ea.	Trowel, Brick, 11" Blade	* 1.09	* 2.18



<u>NO.</u>	<u>Unit</u>	<u>Description of Item</u>	<u>Unit Cost</u>	<u>Cost</u>
2	ea.	Pliers, Long Nose, 6"	\$ 1.75	3.50
6	ea.	Pliers, Linemens', Side Cutting, 8"	1.90	11.40
2	ea.	Punch, Metal Whitney #5 Jr., Capacity - $\frac{1}{4}$ "		
		Hole in 16-gauge, Set of dies and punches	* 7.70	*15.40
*1	ea.	Punch, Metal, Whitney, #2 Capacity 5/16", hole in $\frac{1}{4}$ " thickness (with 5/32" punch and die)	* 16.50	*16.50
4	ea.	Punch, Center, 5/16" stock, Length-4",	0.25	1.00
4	ea.	Punch, Prick, 5/16" stock, Length-4"	0.25	1.00
*1	ea.	Rake, Round Bow, Steel, 14" width of head	* 1.00	* 1.00
1	ea.	Rasp, Wood, Flat, 12"	0.85	0.85
1	ea.	Rasp, Wood, Flat, 16"	1.15	1.15
20	lbs	Raop, Bengal, 3/4"	0.32	6.40
4	ea.	Rule, Steel Tape, 6'	0.83	3.32
4	ea.	Rule Extension with lock joints and strike plates, 6'-6"	0.75	3.00
4	ea.	Rule, Spring Joint, Zig Zag, 6'	0.21	0.84
1	ea.	Saw, Compass, 12" blade	0.60	0.60
2	ea.	Saw, Crosscut, 26" blade, 8-point	3.75	7.50
1	ea.	Saw, Hand, Rip, 26" blade, 5 $\frac{1}{2}$ -point	4.25	4.25
4	ea.	Screwdriver, Carpenters', 6" Blade	0.25	1.00
4	ea.	Screwdriver, Carpenters', 8" Blade	0.40	1.60
*4	ea.	Set, Rivet for 1 $\frac{1}{2}$ lb to 2; 1b rivets	* 0.75	* 3.00
4	ea.	Set, Nail	0.08	0.32
*2	ea.	Shovel, Long Handle, Rd. Pt.	* 1.00	* 2.00
*2	ea.	Shovel, Long Handle, Sq. Pt.	* 1.00	* 2.00
*1	ea.	Shovel, D Handle, Rd. Pt.	* 1.00	* 1.00
*1	ea.	Shovel, D. Handle, Sq. Pt.	* 1.00	* 1.00
*1	ea.	Slitter, Metal, Bench type, 10 ft. capacity, Without bench	* 55.00	*55.00
*1	ea.	Snips, Bulldog, 17"	* 3.50	* 3.50
*1	ea.	Snips, Scroll-Pivoter, (aviation type) 12"	* 3.85	* 3.85
4	ea.	Snips, Tinnners, Regular, Straight Pattern, 13"	2.00	8.00
3	ea.	Square, Combination, 12" Blade, with Level and Scriber	1.00	3.00
2	ea.	Square, Framing, 24" Body, 12" Tongue	3.00	6.00
1	ea.	Stone, Sharpening, Carborundum Combination, 6"	1.25	1.25
1	ea.	Tape, Corded, Measuring, 50ft., $\frac{1}{2}$ " wide, Metal case.	1.00	1.00
*2	ea.	Trowel, Brick, 11" Blade	* 1.09	* 2.18



MCWA Form 702

<u>NO.</u>	<u>Unit</u>	<u>Description of Item</u>	<u>Unit Cost</u>	<u>Cost</u>
*1	ea.	Trowel, Plastering, 11" Blade	\$* 0.80	* 0.80
*3	ea.	Trowel, Pointing, 5" Blade	* 0.45	* 1.35
*1	ea.	Vise, Clamp Base, Woodworkers, Jaws 4-5/8" wide open to 4"	* 3.50	* 3.50
*1	ea.6	Wheelbarrow, Contractors, Pneumatic Tire, 4 cu. ft. capacity	* 17.00	17.00
1	ea.	Wrench, Crescent, Single end, adjustable 8"	0.70	0.70
1	ea.	Wrench, Crescent, Single end, adjustable 12"	1.25	1.25
1	ea.	Wrench, Pipe, Stillson, Steel Handle, 18"	2.55	2.55
1	ea.	Wrench, Pipe, Stillson, Steel Handle, 14"	1.80	1.80
Total Cost _____ Carpenters furnishing own tools _____				*463.91
Total Cost _____ All tools _____				\$592.48



LIST OF EQUIPMENT FOR  
ONE RAT ERADICATION CREW--RATPROOFING PROJECT

<u>NO.</u>	<u>UNIT</u>	<u>DESCRIPTION OF ITEM</u>	<u>UNIT COST</u>	<u>COST</u>
4	doz.	Bottle, Glass 1 pt. cap. with screw cap	\$ 0.50	\$ 2.00
2	ea.	Bottle, Glass, Handled, 1 gal. cap. with screw cap	0.25	0.50
2	ea.	Brush, wire, shoe handle	0.30	0.60
1	ea.	*Chopper, meat, hand, cap. 3lb. per. min.	4.00	4.00
1	ea.	Crock, stoneware with cover, 6 gal. cap.	2.00	2.00
2	ea.	Funnel, tin 3½ diam. top	0.10	0.20
4	pr.	Gloves, heavy leather, gauntlet	2.00	8.00
4	pr.	Gloves, rubber	0.60	2.40
1	ea.	Graduate, white enameled, 32 oz. cap in oz.	1.00	1.00
1	ea.	Knife, Boring 5" blade	0.60	0.60
3	ea.	Knife, Paring, 3" to 4" blade	0.40	1.20
1	ea.	Opener, can, table type	0.30	0.30
1	ea.	Padlock No. 1 master	1.65	1.65
2	ea.	Pan, dish, 14 quart cap.	1.10	2.20
2	ea.	Pump, foot, cyanogas, 5 lb. (metal container)	9.00	18.00
1	ea.	Pump, foot, cyanogas, 3/4 lb. (glass, jar)	7.50	7.50
1	ea.	Scale, counter, with scoop, cap. 25 lbs. cap. of beam - 4 lbs. by ½ oz.	12.00	12.00
2	ea.	Shaker, hand, 5 lb. cap (for dusting)	2.00?	4.00?
4	ea.	Shaker, hand 1 lb. cap. (for dusting)	1.00?	4.00?
2	ea.	Spoon, basting, 21 - inch	0.25	0.50
400	ea.	/ Trap, Rat, Steel No. 0	0.17	68.00
400	ea.	/ Trap, Rat, Victor Snap	0.08	32.00
2	ea.	Tub, Wash, Galvanized	0.90	1.80
				<u>\$174.45</u>

\* Large programs should be provided with a power driven mixer and grinder combined.

/ Varies with species of rat present (If Norways predominate, suggest 600 steel and 200 snaps; if Rattus species predominates, suggest 200 steels and 600 snaps)

Note: It is assumed that the rat eradication personnel will utilize certain necessary equipment listed under "equipment for one Ratproofing Crew" such as buckets, shovels, pliers, hammers, flashlights, step ladder, bench grinder and wire wheel, etc.



LIST OF LABORATORY EQUIPMENT AND SUPPLIES  
FOR ONE RATPROOFING PROJECT OR A COMBINED  
RATPROOFING AND DDT DUSTING PROJECT

<u>NO.</u>	<u>Unit</u>	<u>Description</u>	<u>Unit Cost</u>	<u>Cost</u>
2	qt.	Alcohol, Ethyl 95%	\$ 0.40	\$ 0.80
1	box	Applicator, wooden, $6\frac{1}{4}$ x $1\frac{1}{2}$ " diam. in boxes of 72 doz.	0.30	0.30
100	ea.	Bags, cloth, rat	0.04	4.00
1	ea.	Centrifuge, portable, electric operated two- tube	17.00	17.00
4	lb.	Chloroform, commercial, in 1 lb. bottles	0.52	2.08
1	lb.	Cotton, absorbant	1.20	1.20
4	cans	Ether, in $\frac{1}{2}$ pt. cans	0.36	1.44
1	ea.	File, slim taper, 10"	0.22	0.22
1	pr.	Forceps, fine - toothed	2.50	2.50
1	pr.	Forceps, syringe	3.00	3.00
2	pr.	Gloves, cotton	0.20	0.40
2	pr.	Gloves, rubber	0.60	1.20
1	ea.	Jar, Chloroform, clear glass, 5" or larger mouth with tight fitting lid, about 2 gal. capacity	2.00	2.00
1	book	Labels, Gummed, Perforated, Approximately $3\frac{3}{4}$ " x 1" in book of 1120.	0.60	1.20
2	doz.	Needles, 20 Ga., 1" or $1\frac{1}{2}$ " fitted with wire trocar	1.50	3.00
1	ea.	Pan, white, enameled, about 18" x 24" x 5"	4.00	4.00
2	ea.	Pan, white, enameled, about 8" x 10" x 3", with cover	2.80	5.60
2	ea.	Ruler, Millimeters	0.15	0.30
1	doz.	Syringe, 10	18.00	18.00
200	ea.	Tags, Rat	0.01	2.00
1	roll	Tape, gummed paper	0.35	0.35
2	doz.	Tubes, mailing, $2\frac{1}{2}$ " diam. x 5"	1.75	3.50
1	gross	Tubes, Wasserman, with corks	3.00	3.00
1	gross	Vials, (Flea), 2 dram capacity with corks	2.25	2.25
1	gross	Vials, centrifuge tubes, With corks	9.07	9.07

Total

\$88.41

Additional equipment needed locally:

Sterilization equipment for syringes, needles, vials  
Refrigeration equipment for blood and serum specimens.



LIST OF MATERIALS FOR ONE RATPROOFING CREW (Initial Order)  
Construction Materials:

<u>No.</u>	<u>Unit</u>	<u>Description</u>	<u>Unit Cost</u>	<u>Cost</u>
1,000	sq. ft.	24 ga. Galvanized sheet steel	\$ 0.05	\$ 50.00
3,000	sq. ft.	2x2, 17 ga. (or 3x3, 19 ga.) Galvanized Wire (Hardware) Cloth	0.05	150.00
2,000	sq. ft.	16 - mesh. copper or Galvanized screen wire	0.03	60.00
750	sq. ft.	1/2 in. 18 ga. Galvanized expanded Metal (Regular mesh)	0.15	112.50
500	lbs	Galvanized Common and Finishing Nails and Staples, Various sizes	0.20	10.00
20	gross	Brass, Nickled, or Galvanized Round Head Screws, Various sizes	0.60	12.00
1,000	bd. ft.	Lumber, well-seasoned, various sizes	0.10	100.00
3	box	1 1/4 lb. Tinnings' tinned Rivets flat head, in boxes of 1,000	0.40	1.20
2	box	2 1/2 lb. Tinnings' Tinned Rivets flat head, in boxes of 1,000	0.60	1.20

Other miscellaneous items depending upon the particular project and the availability of materials locally (as brick, cement, sand, gravel, hardware, threshold strips, glass, etc.) - - - - - L. S. 200.00

Sub-Total \$696.90

Eradication Materials:

25	lbs.	Fortified Red Squill (Standardized 500 - 600 Mg./Kg.). Powder	\$ 1.90	\$ 47.50
20	lbs.	Arsenic Trioxide, Micronized	0.10	2.00
10	lbs.	Poison "1080"	(Not in production)	
25	lbs.	Poison "ANTU"	(Not in production)	
100	lbs.	DDT, 10% in Pyrophillite	0.13	13.00
40	lbs.	Zinc Phosphide	0.70	7.00
5	lbs.	Thallium Sulfate	12.50	62.50
15	lbs.	Tartar Emetic (Antimony potassium tartrate)	2.07	31.05
150	lbs.	Baits, various (Including staples, fresh fruits, vegetables, meat and fish, peanut butter, dog food, etc.)	0.10	15.00
10	lbs.	Binders and Lures (as bacon, fats, syrup, salad oil, etc.)	0.30	3.00
10	pkgs.	4" x 4" squares, paper (Misprint) waxed, in packages of 1,000	0.15	1.50
25	lbs.	Cyanogas, A - dust	0.35	8.75
25	lbs.	Flour	0.04	2.00
25	lbs.	Phosphoric Acid, 85% syrup	0.70	17.00

Sub Total \$210.00

Total (Materials) \$907.60